

WR-ALC
Technical Order Management
Digital Data Strategy

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Prepared by: TIL Home Office

WR-ALC Technical Order Management Digital Data Strategy

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1. Introduction.

1.1 Introduction.

The purpose of this document is to provide the WR-ALC Single Managers (SM) with the processes, tools, and infrastructure to facilitate both current and future planning and implementation of the basic business functions associated with the system and commodities Technical Orders (TO) maintained by each SM. This Strategy documents the corporate approach that WR-ALC will adopt for implementation, once coordination and approval is obtained through the Centralized Technical Order Management (CTOM). It represents a community management tool that will progressively interface all the WR-ALC SM TO management responsibilities into a digital environment. This document will serve as a model approach that has the potential for Air Force wide adaptability and implementation. This digital data process flow for TOs is illustrated in Attachment 1.

a. Today there are numerous digitization and automation efforts underway throughout the TO community. This Strategy has been created to focus efforts, ensure interoperability, avoid duplication, prevent proliferation of stand-alone systems, integrate with Air Force policy, and prevent possible system incompatibilities. The Home Office will serve as the Infrastructure Manager, Digitization Focal Point, Technical Experts, and Policy Guidance OPR for all facets of TO management responsibilities at WR-ALC.

b. To meet a wide variety of requirements levied by Air Force users and WR-ALC SM Technical Order Management Organizations (TOMOs), the Home Office must provide an infrastructure of technical capabilities and business processes to assist a rapid migration from paper-based published products toward a fully electronic environment. A variety of solutions apply to and provide the flexibility for all existing, planned, and future systems and processes developed, deployed, and/or managed by WR-ALC SMs. This encompasses legacy data conversion, digital technical data acquisition, sustainment and management processes.

1.2 Consolidated WR-ALC/Air Force Solution.

This Strategy is developed as a corporate effort by engineering and technical data management expertise within the Home Office. The consensus among the Home Office functional experts, via the WR-ALC CTOM Working Group, will provide a consolidated charter and a functional Concept of Operation (CONOPS) substantiating this approach which will become the baseline for managing and sustaining the SM TO data processes.

1.3 Clients and Customers.

This document recognizes two categories of people that need access to digitized technical data. The first category, clients, consists of the OPR who owns and creates the information, the Single Manager (SM) Technical Order Management Organization

(TOMO). The second category, customers, is the end user of the “published” product consisting of anyone needing access to digital technical orders (TOs) managed at WR-ALC.

1.4 Product Categories.

The types of products in the inventory at WR-ALC consist of anything from paper to an electronic environment that will differ among the various platforms and types of data maintained. Analysis of the inventory showed the following product categories:

- a. Paper-Based TOs
- b. Raster/Indexed Raster TOs
- c. Generalized Markup Language (GML) TOs - Automated Technical Order System (ATOS)
- d. Standard Generalized Markup Language (SGML) TOs
- e. Portable Document Formats (PDF)/Indexed Portable Document Formats (IPDF)
- f. Desktop Publishing TOs (PageMaker, FrameMaker, etc)
- g. PC-based TOs (MS Word, Wordperfect, etc)

1.5 TO Infrastructure.

For the purpose of this Strategy, the TO infrastructure is defined as follows: all resources needed to complete and support the acquisition/acceptance, conversion, maintenance, and distribution of paper-based and digital TO products. This infrastructure includes the people, training, hardware/software, networking, and connectivity required for acquiring, creating, managing, publishing, viewing, stocking, storing, and distributing of TOs.

1.6 Guidance Documents.

The documents providing the guidance to define this Strategy are as follows:

- a. Air Force Digital Data Strategy
- b. WR-ALC/TILT Technical Order Digital Data Requirements
- c. Air Force Single Manager’s Guide for Implementing Digital Technical Orders
- d. TO 00-5-1 Air Force Technical Order System
- e. TO 00-5-2, Technical Order Distribution System
- f. TO 00-5-3, Air Force Technical Manual Acquisition Procedures

- g. DoD 5000.2-R Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automation Information System (MAIS) Acquisition Programs
- h. AFMCI 21-301 AFMC Technical Order System Implementing Policies
- i. AFMCMAN 21-1 AFMC Technical Order System Procedures
- j. Air Force Technical Order Conversion Requirements (TOCR)
- k. Combat Air Force (CAF) Digital Technical Data Requirements

2. Technical Data Support Structure.

The technical data support structure at WR-ALC consists of efforts performed by the Home Office and by the TOMOs. Each of the TOMOs actively interacts with the Home Office for guidance and other related TO support activities.

2.1 Home Office.

The Home Office supporting function consists of Centralized Technical Order Management (CTOM) Chairperson, Engineering, TO Functional and AF Policy, Contract Administration, Control Desk and System Administrators for Joint Computer-Aided Acquisition and Logistics Support (JCALS), Automated Technical Order System/Digital Legacy Data Storage System (ATOS/DLDSS), CENTRA, and DCS.

2.2 Technical Order Management Organization (TOMO).

The TOMO consists of the TOMO Manager, TO Managers, and Distribution or Item Managers.

3. Electronic Publishing.

3.1 Definition.

There are several distinct processing levels associated with TO publishing initiatives. Each level varies in terms of production automation and integration within a total digital environment. Each distinct level can be grouped into one of two groups of electronic formatted data: authoring format and electronic presentation/output formats. Each electronic authoring format is capable of producing specific electronic output and presentation types.

- a. PC-based Word Processing

- b. Desktop Publishing
- c. Generalized Markup Language (GML)
- d. Standard Generalized Markup Language (SGML)
- e. Electronic Technical Manual/Interactive Electronic Technical Manual (ETM / IETM)
- f. Raster/Indexed Raster
- g. Portable Document Format/Indexed Portable Document Format (PDF / IPDF)
- h. Hypertext Markup Language (HTML)

3.2 Authoring Formats.

3.2.1 PC-based Word Processing.

This publishing solution encompasses the use of PC-based software packages i.e., Microsoft Word, and WordPerfect. These types of capabilities support quick change turn-around but are platform and format dependent which do not provide a standard approach to document management. Output products are primarily paper and would require additional efforts if conversion to IPDF is required.

3.2.2 Desktop Publishing.

This publishing solution includes several publishing toolkits that provide capabilities beyond those available in word processing packages and are easier to use than some batch composition systems. These products; i.e., FrameMaker, Interleaf, PageMaker, and Ventura, exhibit the following common characteristics:

- They employ a graphical user interface to provide a full-screen what-you-see-is-what-you-get (WYSIWYG) editor.
- Each has its own proprietary markup scheme, which is supported by that product only. The richness of the markup provides for significant page formatting.
- Composition is accomplished interactively, and the composed results are visible on the screen.
- The inclusion of graphics in a document is supported, although the flexibility of graphic placement varies with each package.
- All include footnote, table, and generated material-processing capabilities.
- PostScript and Hewlett Packard's (HP) Page Description Language (PDL) output drivers are supported for use with laser printers or phototypesetters.

3.2.3 Generalized Markup Language (GML).

GML represents a general-purpose language for describing the structure of data. GML is very much like Standard Generalized Markup Language (SGML), minus the standards. GML operates with embedded Data Type Definitions (DTD) and format files which allow flexibility in dealing with legacy data. GML was derived to provide a universal tool that

eventually evolved into the standards associated with SGML. GML is the language used by the ATOS system for authoring technical manuals.

3.2.4 Standard Generalized Markup Language (SGML).

3.2.4.1 SGML Description.

SGML represents a general-purpose language for describing the structure of data. SGML became an official standard in 1986 (ISO 8879). DoD's Continuous Acquisition Life-cycle Support (CALS) initiative served as a catalyst for moving technical data towards a completely tagged and authored database. SGML is used for describing text-based structures and uses DTDs and Formatting Output Specification Instance (FOSI) for producing a printed document.

3.2.4.2 Data Type Definition (DTD).

A DTD is an ASCII text file that describes the structure of a class of documents--what elements they must or may contain and the order and frequency of their occurrence in a document. A DTD can be thought of as a structural outline of a document and a set of rules that govern the order that the tags may be used in a document. Documents stored in SGML are tagged ASCII files that can be read by virtually any formatter on the market. The ASCII files may be stored on any computer and processed by any number of applications. Implementing SGML can require considerable overhead. And if existing documents must be converted into generic form, the more complex the document, the more difficult and costly the conversion process becomes.

3.2.4.3 Formatting Output Specification Instance (FOSI).

A FOSI is a specification instance which "reads" an SGML-tagged file and produce an output properly formatted for the output medium (i.e., print, computer screen, etc.). A separate FOSI is required for each different type of document and each medium.

3.2.4.4 Document Storage.

Documents stored in SGML are tagged ASCII files that can be read by virtually any formatter on the market. The ASCII files may be stored on any computer and processed by any number of applications. Implementing SGML can require considerable overhead. If existing documents must be converted into generic form, the more complex the document, the more difficult and costly the conversion process becomes.

3.2.4.5 Using SGML.

SGML may be used strategically, both as an intermediate format for filtering information and as a native file format. The native format approach is particularly appealing because it offers the advantages of allowing for data to be reused, revised, and republished in years to come. The SGML structure is also a good, neutral basis for distributing the text in various electronic formats. The SGML standard supports multimedia documents, allowing for various types of external data objects to be referenced and incorporated into the basic document structure. For example, scanned images, computer graphics, and audio and video files can become part of the document even though they reside as separate files on the disk. Because SGML is content-independent, any data type may be considered part of a document as long as it is declared in the DTD.

- a. The key criterion for whether or not to use SGML is the intended use of the information. If the intent is to build a database, a library of electronic documents that is portable over time, or just a set of information that may be produced in a variety of forms (including pages), then SGML provides the standard to support the goal. Where SGML usually pays off is with online search and retrieval and down the road when your data is in a format that is sufficiently flexible to support new media or products, whatever they might be.
- b. Rather than try to force an architecture onto applications, SGML provides a meta-language for developing architectures. It is a standard notation for representing multiple content data models. Despite the differences in encoding among different applications, all SGML applications are unified in their adherence to the standard.

3.2.5 Electronic Technical Manual/Interactive Electronic Technical Manual (ETM/IETM).

3.2.5.1 Definition.

An IETM, as defined in the DoD IETM Specification, is a package of information required for the diagnosis and maintenance of a weapon system, optimally arranged and formatted for interactive screen presentations to the end-user. It represents an electronic presentation of a paper technical manual. An IETM is designed for electronic screen display to an end-user and has the following characteristics:

- a. The information is designed and formatted for screen presentations to enhance comprehension.
- b. The elements of technical data making up the technical manual are interrelated. A user's access to required information is possible by a variety of paths.
- c. The computer-controlled technical manual display device functions interactively (as a result of user requests and information input) to provide procedural guidance, navigational directions, and supplemental information.

IETMs allow a user to locate required information faster and easier than it is possible with a paper technical manual. They are easier to comprehend, more specifically matched to the system configuration under diagnosis, and are available in a form that requires much less physical storage than paper. MIL-PRF-87268A and MIL-PRF-87269A define the process for authoring and displaying IETMs.

3.2.5.2 ETM Classes.

The Tri-Service Working Group on IETMs has defined six classes of ETMs. These classes were devised in order to adequately analyze the need for standards and to determine which standards are required. The six classes are defined within three groupings.

3.2.5.2.1 Basic Classes of ETMs (Page Flippers).

- a. Class 0 - Nonelectronically-indexed page images. These page images are intended for electronic archival filing or Print-on-Demand. These allow pages to be viewed on an electronic display but have no detailed index for navigating through the document for the purpose of on-line usage. This class is best used for producing printed (hard copy) pages.
- b. Class 1 - Electronically indexed page images. These page images are intended for full-page display and use, allowing navigation by means of an automated intelligent index to the page images for user access. These systems can be used in a library or reference setting for reading and research use. Simple raster images that are produced by scanning the hard copy are considered unchangeable until further converted to an editable format.

3.2.5.2.2 Advanced Classes of ETMs (Scrolling Hypertext).

- a. Class 2 - Electronic scrolling document systems for interactive display of ASCII encoded documents using an intelligent index and hypertext tags inserted into a tagged document file. Generally, the document is the result of a simple conversion from a page-oriented document with little reauthoring except for the addition of hypertext tags. These tags allow a user to navigate through the document but, have very limited, if any, author-inserted navigational aids or a content driven NEXT function. Class 2 is considered intelligent raster or PDF data that represents the last of the page based systems and provides some limited change capability.
- b. Class 3 - Interactive display of technical information which is SGML tagged using standard tags to the maximum extent possible and using a hypertext presentation system for display in accordance with MIL-PRF-87268A. It is

based on a linear SGML document file and not a hierarchical-based database. Navigation is based on author developed constructs employing prompted dialog boxes and content driven logical NEXT functions. Class 3 represents ASCII files that are digitally tagged, using SGML for style and format, to provide a simplified change capability.

3.2.5.2.3 Extended Classes of ETMs (Interactive Databases)

- a. Class 4 - Interactive electronic display of technical information specifically authored into and maintained in a non-redundant relational or object-oriented hierarchical database. These source databases are subsequently packaged as a run-time database for interactive presentation in accordance with DoD specifications. Class 4 is a full IETM, with all data entered in a database and connected by hypertext links, which are non-page-based, and usable only with computers.
- b. Class 5 - Integrated Electronic Technical Information System (IETIS) for interactive presentation of Class 4 IETMs integrated with the data for other processes including expert system rules for the display of information and other user applications such as diagnostics or computer-managed training. These IETMs require computational processes and/or expert systems.

3.3 Presentation/Output Formats.

3.3.1 Raster/Indexed Raster.

Raster data represents a page image of a scanned document. Index raster provides Table of Contents (TOC) for searching and linking of a complete document after digitization. Complete documents are interfiled prior to digitization to establish a baseline document. Future change packages are required to be scanned and merged to the baseline document. Raster data initiatives support Print-on-Demand (POD) and elimination of a paper warehouse. Viewing of raster data requires a viewer software package. Raster data is the lowest intelligent form of digitization and should be applied as a strategy when dealing with low and/or no change maintenance documents; i.e., Commercial Manuals.

3.3.2 Portable Document Format/Indexed Portable Document Format (PDF/IPDF).

PDF/IPDF data represents a page image of a document that may provide viewing and word search capabilities. Viewing of PDF files is accomplished using the Adobe "Reader" software: a freeware product obtainable from the Adobe site on the WWW. PDF files are a good choice as a distribution format because of their level of intelligence and their file size. PDF files are indexed in accordance with the TOCR document. Initial PDF files being converted by the Air Force PDSM Program Office, and the TO Conversion

Operations (TOCO) Facility include the digitizing of complete TOs. IPDF provides linking on a predetermined set of index parameters that are established and set as part of the conversion of a document in PDF. IPDF can be generated from SGML, Postscript, and other Desktop Publishing TO source data and is a platform independent digital file type suitable for viewing, document navigation, and POD. IPDF data has been established by the AF as the preferred delivery and distribution file type. Processing guidelines can be obtained from the AF Digital Data Strategy document that is available via the PDSM site on the WWW.

3.3.3 Hypertext Markup Language (HTML).

HTML data represents a World Wide Web (WWW) display medium that utilizes a particular type of viewer, an HTML browser. HTML is a collection of styles used to define the various components of a WWW document. HTML documents are in a plain text format and can be created using any text editor and from a variety of authoring formats. HTML uses tags to tell the WWW viewer how to display the text. HTML lacks standardization as evidenced by the seemingly endless upgrades and variant versions of HTML. Therefore, developers of HTML-tagged information have to constantly concern themselves with the viewing, or browsing, capabilities of their customers. The chief power of HTML comes from its ability to link regions of text (and also images) to another document (or an image). These regions are typically highlighted by the browser to indicate that they are hypertext links.

3.4 Authoring/Presentation Relationships.

Listed below are the authoring formats along with their associated presentation or output formats:

- a. Word Processor: Postscript, PDF/IPDF, ETM (Class 2), and HTML
- b. Desktop Publishing: Postscript, PDF/IPDF, ETM (Class 2), and HTML
- c. GML: Postscript
- d. SGML: Postscript, PDF/IPDF, ETM/IETM (Class 3-5), and HTML

3.5 Content/Source Data Maintenance.

- a. Organic: Organic maintenance and source database systems consist of ATOS, Desktop Processing Systems, Word Processing Systems, and JCALS.

- b. Overflow: The current editorial overflow contractor is HEBCO. HEBCO has employed the use of the PageMaker Desktop Publishing application program and has developed an Electronic Technical Order Database (ETOD) to facilitate the management and storage of TO data.
- c. Prime: Prime contractors maintain source digital databases in various formats, based on specific contract requirements. Most prime contractors utilize Commercial-Off-the-Shelf (COTS) application databases for developing and maintaining the content data, as well as performing configuration management.

4. Infrastructure/Platforms/Systems.

4.1 Description.

To accomplish the management sustainment and distribution of TOs, the Home Office will take advantage of the existing and planned Air Force and WR-ALC computer infrastructures. The hardware infrastructure is made up of approximately five physical systems that will be integrated into a seamless technical environment. The five systems are ATOS, DLDSS, ETOD/ETRAC, CENTRA 2000, Document Capture System (DCS), and JCALS. JCALS is an emerging technology that will basically subsume all the functionalities of existing systems and/or interface to those systems as needed.

4.1.1 Common Desktop Environment (CDE).

A Common Desktop Environment (CDE) has been designated to support the desktop management functions required for users to gain access to current and emerging technologies. The CDE will support the user interfaces required for UNIX-based platforms and Microsoft Windows on PC platforms. Until JCALS is fully operational, the CDE will access the infrastructure via a WWW Home Page as described in Attachment 2. This WWW interface will provide the access mechanism for users to the infrastructure tools employed by the Home Office.

4.1.2 CDE Minimum Standard.

The following is the minimum standard required for the CDE: Pentium Personal Computer, 32 MB RAM, 17" Monitor, 32-bit TCP/IP, X Emulation, connection to Ethernet, and WWW Browser.

4.2 Automated Technical Order System (ATOS).

ATOS is a loose-leaf publication and document management system for Air Force TOs. This system is currently implemented at all of the ALCs. ATOS receives, stores, and maintains digital data to change page data and has the capability to output PostScript and PDF files. ATOS uses data based on GML methodologies. ATOS consists of the following subsystems: production control, text capture, text generation, graphic capture, graphic generation, review, output, and storage. Camera ready “paper” copies are currently forwarded to DAPS for printing. ATOS has the capability to electronically transmit postscript files to DAPS, as well as the capability to produce master CDs for distribution. ATOS functionality will be subsumed by JCALS and data in ATOS will be converted for future sustainment in JCALS.

4.3 Digital Legacy Data Storage System (DLDSS).

DLDSS is an interim electronic warehouse for PDF/IPDF TOs. This interim system is an IPDF TO storage augmentation located at all five ALCs. It enables storage and sustainment of AF IPDF TOs until JCALS is fielded. DLDSS has been added as a subsystem to ATOS. The ATOS/DLDSS implementation consists of two phases: first, the delivery, loading, and approval of baseline TOs and second, the sustainment of baseline TOs by the TO Managers. When JCALS is implemented, the data on the DLDSS will be transferred to JCALS. The first component of DLDSS is based on utilizing a WWW browser as the access mechanism to the system for the review and approval of loaded IPDF TOs.

- a. Once documents are loaded by system administrators, a suspending system is established to facilitate the management of the approval/disapproval cycle by automatically sending E-Mail notifications to applicable managers to notify them that they have documents to review. Once approved, the documents become available for general viewing and printing as required. The second component of the system consists of a set of Commercial-Off-The-Shelf (COTS) software products that have been integrated to form a complete sustainment application.
- b. Sustainment entails incorporation of PDF TO change packages, merged (updated) IPDF TOs (books), and the associated rules files used to relink a TO into DLDSS. Relinking can be accomplished when the source changes are being converted from paper change packages, postscript change packages, and/or PDF change packages. The COTS software products consist of DiTO Change Incorporation, ADOBE Exchange, ADOBE Acrobat Reader, Clean OCR, Alliant InfoLinker, and LinkManager.

4.4 ETOD/ETRAC.

4.4.1 ETOD.

Electronic Technical Order Database (ETOD) is an electronic warehouse for Master Reproduction Storage that was developed by and is maintained by HEBCO. ETOD also

assists in the management and configuration control of the TOs that are sustained by HEBCO. ETOD consists of PageMaker editable and noneditable image TIFF files that can be used for viewing, printing, and archiving.

4.4.2 ETRAC.

The Electronic Tracking and Control (ETRAC) Database is utilized to track work and manage funding and billing processes for the overflow contractor. ETRAC provides status and schedule tracking, warehouse inventory access, ETOD inventory access, reprint turnaround status, job submission by electronic submittal, and billing functions.

4.5 CENTRA 2000.

CENTRA 2000 is an electronic document management system that provides storage, retrieval, and sustainment of electronic documents as objects. An object can be a document, drawing, image, photograph, audio clip, video clip, or a data record. Regardless of the format, objects in CENTRA 2000 have associated programs for viewing and editing. Objects can be vaulted for revisions and access controls and are organized in folders that are nested to form a hierarchical structure similar to a directory structure. Search features include key words and attributes search; i.e., TO publication date. Document uploading can be accomplished individually or in a batch. CENTRA 2000 is a client-server application with Internet capabilities. CENTRA 2000 supports POD by providing instant access to printable documents and allows for the storing of raster and PDF/IPDF documents.

4.6 Document Capture System (DCS).

The DCS is a raster image electronic scanning system for documents. Documents are scanned, indexed, and linked to the table of contents for search capability in CENTRA. Changes to these documents are scanned and electronically merged with the base document. TOs that do not change frequently; i.e., commercial TOs and/or TOs with color and fold-outs, are the best candidates for digitizing with this system.

4.7 TO ToolBox.

The TO ToolBox is a software application server that was created to facilitate a variety of organic TO authoring needs. Many TO authoring capabilities can be accomplished by utilizing Commercial-Off-the-Shelf (COTS) software packages. To determine the most commonly used software packages, a recent survey was conducted of the ten top contractors that comprise the TO authoring industry. The survey data revealed that the majority of the contractors were creating and sustaining TOs in PC-based applications found on the average PC user's desktop. This information presented the Home Office with a unique opportunity to procure a suite of COTS software packages in order to

provide the Single Managers (SMs) at WR-ALC with a ToolBox of the commonly used products.

4.7.1 ToolBox Capability.

The TO ToolBox will provide the capability for supporting the common desktop publishing formats. This capability includes the support and sustainment for digital data that is created by various word processors, desktop publishing packages, and SGML. The Home Office infrastructure will support the capabilities to access the various applications via the Base Local Area Network. Figure 1 depicts the typical hardware components that collectively comprise the TO ToolBox. The software applications for supporting specialized and unique authoring requirements can be configured and customized per each SM. The TO ToolBox will allow the SM to take advantage of being able to sustain TO data in a multiplicity of formats without requiring each SM to separately purchase the costly software application packages.

4.7.2 ToolBox Applications.

After customized user requirements are configured, the user can access a specific TO ToolBox application by attaching to a network drive. TO ToolBox applications are not limited to what has currently been purchased. Additional application packages can be purchased by an SM and loaded in the TO ToolBox for subsequent use. The TO ToolBox also provides access to a QMS 2425 (1200x1200 dpi) laser printer for performing all printing tasks. The printer supports double-sided 8.5 x 11, 8.5 x 14, and 11 x 17 inch paper. Printed products meet the requirement for producing reproducible masters that can be directly sent to DAPS. The printer and physical server is located in Bldg 301, Room A02.

4.7.3 Currently Available Applications.

The applications currently available on the TO ToolBox are Microsoft Word 6.0, COREL WordPerfect, ACROBAT Professional, ALDUS PageMaker 6.0, Adobe Illustrator 4.1, DENEBA Canvas 3.5, HiJaak Graphic Suite, AutoCAD LT, and COREL DRAW 5.0

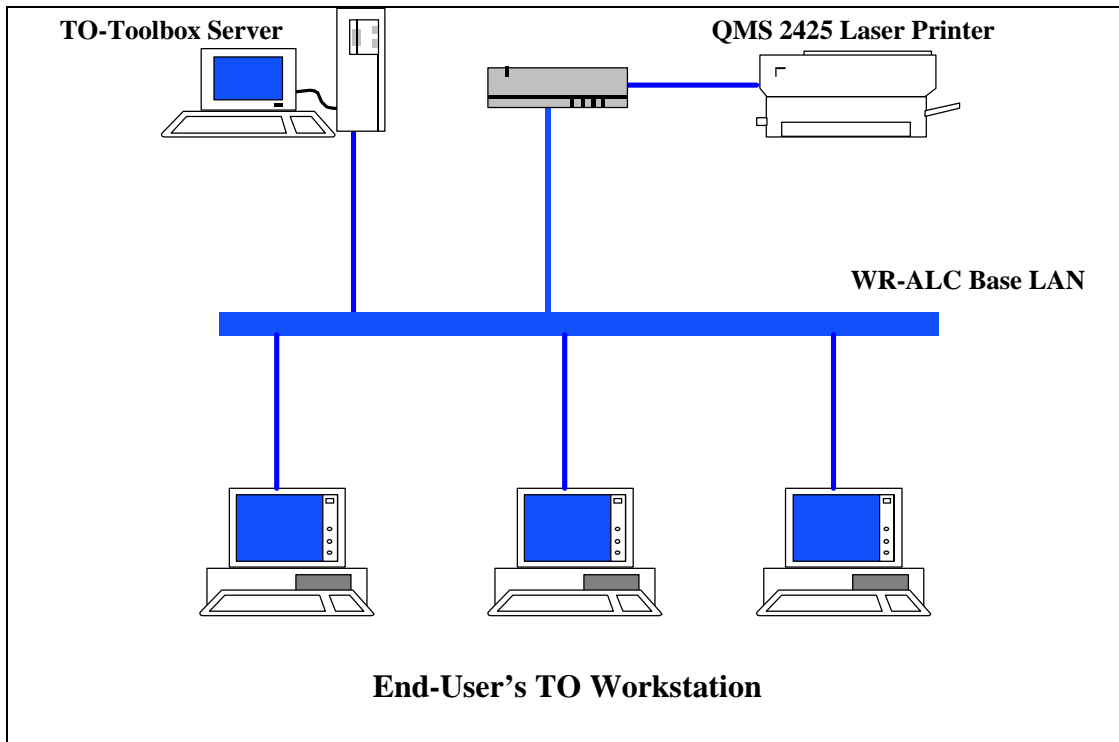


Figure 1. TO ToolBox Hardware Components and Typical Layout

4.8 JCALS.

4.8.1 Description.

JCALs is a joint service information technology program developed to provide the tools for DoD to acquire, manage, access, and update the technical manuals and various logistics data that support DoD weapon systems. The JCALS system was developed in accordance with CALS and industry standards. The infrastructure was originally developed to support the Joint Technical Manual (JTM) System. As a result of the infrastructure design, other DoD programs have been able to leverage the technologies already developed and integrated as part of the infrastructure. JCALS will subsume the functionality of ATOS, G022, and Automated Technical Order Management System (ATOMS). JCALS will interface to Automated Computer Identification Number System (ACPINS), Security Assistance Technical Order System (SATODS), and Joint Engineering Data Management Information Control System (JEDMICS). Also, planned is an interface to the Integrated Maintenance Data System (IMDS). JCALS integrates computer hardware and software, creating a shared data environment in which authorized users can access information regardless of format, location, or time of day. This “just-in-

time” information is powered by the infrastructure which creates dramatic improvements and significantly reduces costs.

4.8.2 Key Characteristics.

- a. A system architecture which allows the sharing of logistics technical information among various users.
- b. A common and integrated structure for organizing data about a weapon system during its entire life-cycle.
- c. Interfaces among Government agencies and existing legacy systems.
- d. The implementation of DoD-wide standards for logistics technical information.
- e. A flexible architecture that can grow in size, scope, and functionality, adapting to the needs of acquisition and logistics support of weapons systems into the next century.

4.8.3 Functional Components.

JCALs is broken into several independent functional components that when combined, form an integrated information systems architecture. These components are Infrastructure, Publishing, and TM Processes.

4.8.3.1 Infrastructure.

The JCALS infrastructure is represented as an architecture that provides a common environment for sets of integrated applications to support different business processes. The infrastructure consists of the following:

- a. Global Database Management System (GDMS) - The GDMS manages, tracks, and accesses data stored in numerous systems distributed across the DoD. GDMS is the key to the JCALS distributed, integrated environment.
- b. Workflow Manager - The Workflow Manager provides the capability to define, manage, and control the work processes within and across geographical and organizational boundaries. Work is distributed via In Box/Out Box functionality and presented to users via the Task Manager, which provides To Do Lists to organize each user’s work responsibilities.
- c. Workfolder - The Workfolder is a shared electronic folder that contains referential data and provides access to applications for manipulating the data.

- d. Reference Library - The Reference Library is a cataloging system for information that acts much like a public library, where users search through a catalog index to identify the information, check out the object of interest, and return objects to the global library.
- e. PC Client - The PC Client provides a graphical Desktop which allows users to gain access to all of the local and workstation server applications. The PC Client is the graphical front end to the JCALS application.
- f. Other functional components - COTS applications (Viewing tools for SGML, Office Automation, E-mail, etc.), Incident Reporting and Tracking (IRTS) for online problem reporting, Data Management Tools, and Application and Data Privileges.

4.8.3.2 Publishing.

The publishing capability of JCALS consists of a collection of publishing tools and two publishing applications built using those tools. Each application has a DTD, FOSI, and a number of hard-coded processes which tie the tools together and manage the interaction of the process within the workfolder. This solution was developed based on CALS standards and applies to newly acquired technical data. The JCALS publishing solution is based on the utilization of COTS products, Arbortext for authoring text, AutoCad for authoring illustrations, and several conversion packages to support multiple graphic formats (TIFF, CGM, IGES, etc.). To deal with existing legacy data, the AF PDSM Program Office is working with the development contractor to develop an Open Publishing architecture which will allow the services to develop and utilize customized processes and to integrate them into publishing applications. The Open Publishing architecture will provide the capability for the AF to develop and install our own publishing applications, centered around the use of the AF developed and maintained DTDs and FOSIs. These mechanisms should support both SGML and non-SGML publishing applications.

4.8.3.3 TM Processes.

The TM Processes or JTM functionality of JCALS is described as a set of applications that provides the capability to support the manage, acquire, improve, publish, stock, and distribute technical management functions. These requirements were derived from the Technical Manual Functional Description document that formed the basis for the JCALS design. Each of the six TM functions provides the software tools necessary for a completely electronic TM management capability.

5. Management Data Systems.

5.1 Description.

Systems utilized at WR-ALC to manage TOs are Card Files/Local Database Tracking Systems, Technical Data Management System (TDMS), Logistic Management of TOs System (LMTOS-G022), and the Joint Computer-Aided Acquisition and Logistics Support (JCALS) System.

5.2 Card Files and Local Database Tracking Systems.

Card Files and Local Database Tracking Systems are used to track and manage TOs. Paper card files are rarely in existence and are minimally used. Local tracking systems have been developed by individual SMs in order to facilitate needs that could not be met by existing management systems. These systems are a stand alone, interim solution that will not be required once JCALS becomes functional.

5.3 Technical Data Management System (TDMS).

TDMS is the Technical Data Management System that was developed at WR-ALC to supplement G022 functions and to allow for the electronic tracking of paper-based card files. There are 14 separate databases contained within the TDMS system; many of which are not currently utilized. TDMS functionality and operation will be subsumed by JCALS. Once subsumed, the system will no longer be maintained at WR-ALC.

5.4 Logistics Management of TOs System (LMTOS - G022).

G022 is the AF recognized system for managing the TO inventory for the AF. G022 provides the functionality for indexing, numbering, distribution, and other activities associated with the management of TOs. G022 is a batch oriented, mainframe-based computer system that is maintained at OC-ALC. G022 functionality will be subsumed in its entirety by JCALS. Once subsumed, the system will no longer be an operational system for the AF.

5.5 Joint Computer-Aided Acquisition and Logistics Support (JCALS).

JCALS will subsume all the functionalities of existing management data systems. The JCALS TM processes functional component will provide the software applications associated with the complete management of TM processes.

6. Implementation/Integration/Operational Processing Strategy and Design.

6.1 Description.

The implementation and operational processing strategy and methodology are described in the Consolidated Activity/Infrastructure Process Model in Attachment 3. This chart is a pictorial representation of the entire concept and methodology to be employed.

- a. The chart incorporates the tools and infrastructure to be provided/supported by the Home Office and directly correlates to specific TOMO process definitions. This model depicts the categories of infrastructure required to support user requirements, matches the infrastructure with product evolution, and details the integration of processes with the infrastructure tools.
- b. The implementation strategy requires the definition and business process definition for four basic functional processes: Acquisition, Sustainment, Distribution, and Digitization. All TO data can be classified into categories. Those categories are (1) SGML Tagged Data, (2) ATOS Data, (3) Contractor Data, (4) Desktop Publishing Data, (5) Data Requiring Change, and (6) Data Not Requiring Change.
- c. The acquisition, sustainment, distribution, and digitization methodology to be employed by each SM should be based on these categories of data and a schedule and migration plan should be defined accordingly. This Strategy defines the tools necessary to support any and all migration and sustainment plans.

6.2 Acquisition, Sustainment, Distribution, and Digitization.

6.2.1 Acquisition.

Acquisition activities should be in accordance with the guidelines set forth in the WR-ALC/TILT Technical Order Digital Data Requirements document, dated 7 Jun 96, this document has been coordinated and approved for use in new contracts. It defines the delivery media requirements, digital TO formats, native formats, SGML, and other associated data requirements.

6.2.2 Sustainment

Sustainment activities will depend on the acquisition strategy employed and on the authoring format to be maintained. Sustainment will not be an issue for data that is authored and maintained by contractors. When change page processing is required, IPDF data sustainment will be accomplished by the tools and processes available in DLDSS. IPDF data that is generated/delivered as a result of block cycle or complete TO book processing will not require sustainment.

6.2.3 Distribution (Print-on-Demand (POD)) Concept.

POD at WR-ALC began in early 1995 with a product team attempting to initialize “Just-In-Time” printing. This team evolved into the POD Integrated Product Team (IPT) chartered to develop and implement the POD processes for all product directorates at WR-ALC assigned with SM responsibility of specific TOs. Testing of the POD theory began in mid-April 1995 with both positive and negative results. POD was possible, but technology and the printing processes were not advanced to the stage of substantiating timely delivery of all the different types and styles of TOs required, especially not with a 3 -to-5 day turnaround from receipt to shipment. The existing Joint Committee on Printing (JCP) regulations require that all DoD printing be accomplished by DAPS. This establishes DAPS as the sole source printer for all paper products produced at WR-ALC. Printing requirements not satisfied by the local DAPS printing unit, at WR-ALC, are contracted through the Government Printing Office (GPO) to an outside printing contractor.

6.2.3.1 Capabilities

POD is designed to provide the using (field) organizations with access to technical data in the most expedient means possible, without the necessity of maintaining a massive warehouse of paper data. Digitization and the storage of this digitized data provides WR-ALC with the capability of meeting this objective. The digitally stored data may be accessed by DAPS, printed, packaged, and shipped to the user upon demand. The total procedure from the receipt of the request to the shipment of the request can be accomplished in as little as 5 working days.

6.2.3.2 Limitations

Color pages, fold-outs pages, and classified documents are limitations in the process of being explored for a pliable solutions. The POD process fully supports multi-TIFF, black/white formats for high speed printing. PDF, color, and fold-outs do not adequately lend themselves to POD, because of the additional costs required. As a result, POD of documents in PDF format is restricted to black/white documents with no color and no fold-outs. In addition, a duplex plotter/printer capable of printing fold-outs and color has not been purchased by DAPS.

6.2.4 Digitization.

Users (customers) of Single Managers (SMs) TO data will drive the rate of change towards digital media. Digitization efforts should be accomplished in accordance with the Air Force Technical Order Conversion Requirements (TOCR). Digitization efforts to support POD can be accomplished in accordance with the functions provided by the DCS (Indexed Raster), as deemed appropriate for Commercial Manuals, low/no change manuals, and any other types of manuals that do not lend themselves to a more intelligent and costly digitization strategy. Extreme care should be taken to eliminate any duplication of efforts or strategies that might include taking an intelligent document to a lesser intelligent form.

7. Functional Responsibility Matrix.

The matrix in Attachment 4 describes the specific activities required for implementing and sustaining a total solutions approach to TO publishing. The matrix is sequenced according to the short; intermediate and long term goals. The functional responsibility identification is a guide for determining workload and funding requirements that are to be realized in meeting the specific goals.

8. Phased Approach to Implementation/Milestones.

The phased approach to implementation is depicted in Attachment 5. This Technical Orders Digital Data Strategy consolidates the effective integration of processes, goals, and infrastructure required to accomplish a complete TO Publishing Environment. The goal methodology described in this attachment is described in the following paragraphs.

8.1 Short Term Goals (0-1 Year)

These goals are defined as beginning today and transitioning into the intermediate goals in 1 year. The goals are established based on current system, infrastructure, and funding environments. These goals take into consideration the requirement for continuation of distribution via paper products, as well as incorporating digital distribution technologies based on customer demand. These goals take full advantage of all expended resources.

8.2 Intermediate Goals (1-3 Years)

These goals are defined as beginning at the end of the short-term period and transitioning into long-term goal in 3 years. The goals are established based on successful migration from current environments to known future system deployment and implementation schemes. These goals take into consideration the move to a more intelligent and sustainable digital environment with emphasis on the declining requirement for paper products. These goals also take full advantage of all expended resources, with the added functionalities provided by the newly implemented architectures.

8.3 Long-Term Goals (3-5 Years)

These goals are defined as beginning at the end of the intermediate period. The goals are based on the full implementation of future technologies and utilization of any existing infrastructure only, when necessary to supplement or enhance the process of infrastructure. These goals depict an entirely digital product distribution and sustainment environment.

9. Acronyms

ACPINS	Automated Computer Product Identification Number System
ATOMS	Automated Technical Order Management System
ATOS	Automated Technical Order System
CALS	Continuous Acquisition Life-cycle Support
CDE	Common Desktop Environment
CGM	Computer Graphics Metafile
COTS	Commercial-off-the-Shelf
CTOM	Centralized Technical Order Management
DAPS	Defense Automated Printing Service
DCS	Document Capture System
DLDSS	Digital Legacy Data Storage System
DTD	Data Type Definition
ETM	Electronic Technical Manual
ETOD	Electronic Technical Order Database
ETRAC	Electronic Tracking and Control
FOSI	Formatting Output Specification Instance
GDMS	Global Database Management System
GML	Generalized Markup Language
GPO	Government Printing Office
HTML	Hypertext Markup Language
IETIS	Integrated Electronic Technical Information System
IETM	Interactive Electronic Technical Manual
IGES	Initial Graphics Exchange Specification
IMDS	Integrated Maintenance Data System
IPDF	Indexed Portable Document Format
IPT	Integrated Product Team
IRTS	Incident Reporting and Tracking
JCALS	Joint Computer-Aided Logistics System
JCP	Joint Committee on Printing
JEDMICS	Joint Engineering Data Management Information Control System
JTM	Joint Technical Manual
LMTOS	Logistics Management of TOs System
MAIS	Major Automation Information System
MDAP	Major Defense Acquisition Programs
PC	Personal Computer
PDF	Portable Document Format
PDL	Page Description Language
PDSM	Product Data Systems Modernization
POD	Print-on-Demand
SATODS	Security Assistance Technical Order System
SGML	Standard Generalized Markup Language
SM	Single Manager

TDMS	Technical Data Management System
TIFF	Tagged Image File Format
TM	Technical Manual
TOC	Table of Contents
TOCO	Technical Order Conversion Operations
TOCR	Technical Order Conversion Requirements
TOMO	Technical Order Management Organization
WWW	World Wide Web